



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: GE90-110B1 BYPASS RATIO (-): 7.3
 UNIQUE ID NUMBER: 01P21GE216 PRESSURE RATIO π_{co} (-): 40.4
 COMBUSTOR: DAC
 ENGINE TYPE: TF RATED OUTPUT F_{co} (kN): 492.6

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{co} (mg/kN)	LTO_{num}/F_{co} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{co} AND MAX nvPM _{mass}	31.5	5.38E+14	471
AS % OF CAEP/10 LIMIT	-	-	13.9
AS % OF CAEP/11 LIMIT (InP)	9.1	12.9	
AS % OF CAEP/11 LIMIT (NT)	14.7	19.4	

MEASURED DATA

MODE	POWER SETTING (% F_{co})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	4.226	12.5	9.15E+13	
CLIMB OUT	85	2.2	3.375	9.5	1.10E+14	
APPROACH	30	4.0	1.029	6.9	1.40E+14	
IDLE	7	26.0	0.334	5.8	1.75E+14	
LTO TOTAL (kg, mg, number of particles)			1390	11174	1.91E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{co} VALUES (mg/kN, particles/kN)				22.7	3.87E+14	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				12.5	1.75E+14	366

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{co})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	14.7	2.60E+14
CLIMB OUT	85	11.7	3.71E+14
APPROACH	30	9.2	6.37E+14
IDLE	7	8.2	9.87E+14

AMBIENT CONDITIONS

FUEL

	From	To		
BAROMETER (kPa)	98.0	98.3	HEAT OF COMBUSTION (MJ/kg)	43.49
TEMPERATURE (K)	295.9	298.7	HYDROGEN CONTENT (%mass)	13.65
HUMIDITY (kg water/kg dry air)	0.0063	0.0094	AROMATICS CONTENT (%vol)	16.4
			NAPHTHALENE CONTENT(%vol)	0.40
			SULPHUR CONTENT (ppm by mass)	71

MANUFACTURER: General Electric Company
 TEST ORGANIZATION: General Electric Company
 TEST LOCATION: PTO, Ohio
 TEST DATES: 25/05/2016-26/05/2016

REMARKS

1. GE Report R2019AE459/Rev. 1
2. Engine S/N 901-007